Statistics 551 Methods for Dependent Data
Spring 2015

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Description: This course will cover advanced topics in time series, spatial processes and stochastic processes. We will begin with the Gaussian Linear Process (GLP) studying the relationship between time and frequency domain approaches for filtered linear processes and move to the state space formulation of the time varying GLP with correlated errors between the state and observation equations. Also covered will be standard classes of nonlinear time series models. Moving to spatial processes we will cover the typical geostatistical approach as well as hierarchical models for space-time processes. Finally we will conclude with an introduction to marked point processes. In each discussion, we will formulate the theoretical foundations and the implementation tools available.

Software: The predominant software package discussed will be R; however, Matlab solutions will also be on the table.

Text: Two texts will be reviewed for this course, namely:

- Nonlinear Time Series: Theory, Methods and Applications with R Examples. Randal Douc, Eric Moulines and David Stoffer CRC Press.
- Statistics for Spatio-Temporal Data by Noel Cressie and Christopher K. Wikle (2011). Wiley.

Audience: The course is designed for advanced graduate students (Ph.D. or MStat) interested in the above topics. Entering students are expected to be able to read, understand and implement advanced material in statistics.

Assessment: Students are assessed based on class participation and presentations.

- It is expected that students come prepared to class for an interactive discussion on the topic of the day.
- Formal assignments will be made to teams of students who will present the solutions to the class.
- Students will prepare a final presentation on a topic related to the course of their choosing. The presentation should be informative to the advanced audience studying methods for dependent data.
- Students exhibiting strong knowledge of the subject and preparation for the discussions will be awarded the highest grades in the course.
- Students will receive a failing grade for 1) not regularly attending class; 2) lack of preparation or engagement in the class discussions; 3) poor quality of presentations on assigned topics; or 4) poor final presentation. Please inform me in advance if circumstances preclude you from attending class.